

# Interak 1

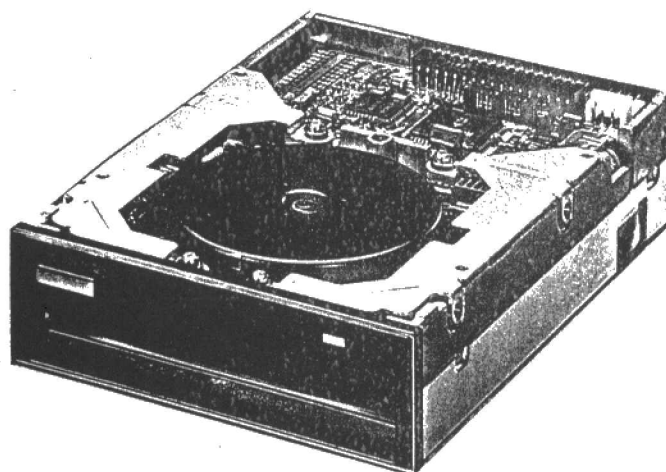
3.5" DISK  
DRIVES

Greenbank Electronics  
Telephone: 051-645 3391

## 3.5" Floppy Disk Drives

### FEATURES

- \* Lower Cost than equivalent 5.25" drives, when purchased new.
- \* Diskettes are genuinely "pocket size" - a 1 Megabyte diskette will fit in the palm of your hand.
- \* Manufactured by Panasonic.
- \* Double sided, twin heads.
- \* 2 x 80 tracks at 135 tracks per inch.
- \* Disk Insertion/Removal lifetime greater than 80,000 cycles.
- \* Drive Seek lifetime greater than 10,000,000 cycles.
- \* Drive Seek lifetime greater than 10,000,000 cycles.
- \* Drive Heads lifetime greater than 15,000 hours of wear.
- \* Media life greater than 3,500,000 passes per track.
- \* Drive design life 5 years or 20,000 power-on hours.
- \* Low power consumption - around 3 Watts. Typically 0.24A @ +5V, 0.2A @ +12V.
- \* Virtually zero standby power (typically 0.03 Watts).
- \* Standard 34-way Interface.
- \* Cool Running.
- \* No need for external power supply.
- \* Virtually silent in operation.
- \* The size of the future, already displacing 5.25".
- \* Size approx 4" x 1.3" x 6".
- \* Mounts in 2" space in the ordinary Interak 3U rack.
- \* Fixing kit available for 3U rack
- \* Light weight, easy fixing.
- \* Motor control allows reduced power consumption and wear.
- \* Fast track to track seek time 3 milliseconds.
- \* Guaranteed by Greenbank Electronics for 12 months (customer damage excluded).
- \* Recording surface protected by an automatic metal shutter.
- \* Impossible to insert wrong way round or upside down.
- \* 3.5" diskettes have a proper metal hub, not a hole punched out of the Mylar film.
- \* Built in plastic slide for write protection.



### 1 Megabyte 3.5" Floppy Disk Drives for Interak

- \* Diskette enclosed by a rigid plastic shell, instead of a paper envelope.
- \* Easy for children to use without damage.
- \* The official "Interak" standard for the future supply of system software.
- \* Interak FDC-1 and CP/M compatible.
- \* Manufacturer's "OEM" detailed Manual available.

### DESCRIPTION

The Interak computer first began as a tape-based system; we all knew that floppy disks were infinitely better, but when the disk drives were several hundred pounds each the step to disks was a giant one to take. Disk drives were available more cheaply on the "surplus" markets but understandably many users were very nervous about buying such technical equipment without being sure of service and support. Many of these users therefore began with tape, knowing that by its very nature Interak would allow them later to upgrade to disks when the time was ripe. The time is ripe now.

Previously we could not supply the disk drives for the Interak system. This was not because we didn't want the extra sales the supply of disk drives would bring (far from it!) but because in all conscience we did not know what to recommend. 8" drives were obviously best, but big and ugly, difficult to mount, needing large power supplies, cooling fans and horrendously expensive when purchased new. 5.25" drives had some attractions; they were smaller, cheaper, easier to mount, and less demanding on power, but we retained the permanent impression that they were simply a cheapened version of their 8" big brothers: smaller, yes; better, no. In our bones we knew someone would invent something better, all we had to do was wait.

### Late entrants

It was a bit like the early days of home video recorders when there was great debate over which was the best system - it was only when that industry had matured that clear winners emerged (and incidentally the winners were not drawn from the original contenders, but were late entrants).

In the floppy disk field the battle is almost over and it is obvious what will be the winning size of disk drive: 3.5" diameter. The size of the future; most major manufacturers are bringing out new models with 3.5" and dropping the old ones with 5.25". Old die-hard computer buffs like ourselves originally sneered at the 3.5" drives, as representing typical Japanese high technology ultra miniaturisation gone mad, but we tried a few and were convinced (together with the rest of the computer world - you'll know we're right when you see IBM adopt them, as they surely will). There are also 3" size drives, but they can be considered as "also rans" - we know Amstrad favour them, but we suspect that is more for commercial reasons than technical; certainly 3" drives and diskettes are not widely available from numerous different competing manufacturers, as is the case for 3.5"; every manufacturer of note makes a 3.5" drive, very few do 3" as well.

The 5.25" diskettes were a simple shrinking of the old 8" size. Physically, the presentation of both the 8" and 5.25" media left a lot to be desired - great care was needed especially if there were youngsters or untrained operators about. Although the method of storing data was perfectly sound, problems occurred in handling - fingerprints and scratches on the exposed recording surface, damage through writing and labelling the diskette jacket, damage to the drive hole punched through the centre of the diskette, and so on, even inconveniences like inserting diskettes upside down or wrong way round, covering and exposing write protect notches with sticky labels and so on. Much more data was lost through handling problems than through a failure in technology.

The 3.5" disk drives were designed to solve all these problems, and present the following advantages. (There is only one disadvantage we can see and that is the diskettes - at the moment perhaps only while they're new - cost a little more, but we think this is irrelevant. When you consider that the cost of storage on the 3.5" diskettes we recommend is well under 1p per kilobyte, you must be a cheapskate if you are willing to risk your data just to save a few pennies! If quality and performance wasn't worth paying a little extra for we'd all be driving Sinclair C5 cars!)

### Rusty

Low cost is the primary advantage. These drives only cost a little more than a good quality hi-fi tape deck, so for computer use this about means the end of the tape recorder for anything but the most specialised needs for mass storage. For a while you may see bargains about in the other sizes, say 3.0" drives and 5.25" drives for 50.00 or even less. If you do and you fancy taking advantage of them go ahead, but beware that they are probably such bargains because they are being "dumped". Large stockpiles of non-3.5" sized drives aren't going to be allowed to lie idle in warehouses, going rusty. If they can't be sold at their full price (and they can't) they have to be dumped; someone else's loss will be your gain, but we have to choose wisely for the future which is why we are not interested ourselves in obsolete equipment.

In any case it not always cheapest in the long run to purchase surplus bargains. The drives which are being dumped most vigorously are the low capacity (say 200K - 400K) types which are no longer used in new computers. If you have to buy two or four times as many diskettes to store the same amount of data you will soon spend all you have saved.

### Dubious

The 3.5" disk drives are typical Japanese money spinners. Colossal amounts of research and precision

engineering have gone into the design but the finished product can be mass produced to work reliably year after year, and best still cost less than they did before. When we purchased our own 8" drives brand new some years ago our supplier only had enough confidence to guarantee them for 90 days. We are so confident about the quality of these disk drives that we guarantee them ourselves for a whole 12 months. (But not if you drop them or blow them up by wrong connections etc., so you still have to treat them with the respect they deserve!) This guarantee alone can save you pounds when compared with a purchase of a dubious second hand "bargain" which lets you down. Also of course you can have confidence that they are compatible with the Interak system; that's guaranteed too.

In the past handling diskettes was always a worry - data was always at risk because the operating surface was exposed through the hole in the envelope. When diskettes were sent through the post there was always the worry about adequate packing because they really were floppy. There is a story, we don't know if it's true or not, about some diskettes sent through the post in a packet marked "Floppy disks - do not bend". They had been folded in two at their destination, and the postman had appended the words "Oh yes they do!" Each 3.5" diskette has its own metal sliding shutter which covers the vulnerable part of the diskette, and the whole casing is made of rigid plastic - the floppy disks are floppy no more.

### Classic

The design of the drives is such that it is impossible to insert the diskette the wrong way round or upside down. (As if you would.) We know this is an important safeguard because already, in a moment of inattention we have several times unsuccessfully tried to do just that. With the old design of 5.25" or 8" drives there was no protection against such stupidity. One classic error we committed in a moment of great stress was to insert a second 8" diskette into a drive, without taking the old one out first. Luckily the error was noticed before disaster struck, but it was a near thing.

Do not fear that the extra complexity of the shutter and the plastic casing increases the price. There is of course less material used in the manufacture of a 3.5" diskette than the larger sizes, and anyway, how do you store your LP's? Loose in a great scratchy pile of unprotected disks, or do you look after them by protecting the surfaces in the proper jackets; is it worth it? You bet it is! Of course all diskettes have to be labelled and the hard plastic shell of the 3.5" diskettes allows you to write on the cartridge even with a ball point pen. (Doing the same on the thin flexible jacket of a 5.25" or 8" diskette would lose you some Brownie points!)

One of the worst parts of the design of the larger sized diskettes is that the central hole is simply punched out of the thin plastic film and all the rotational force is transmitted through the edges of that hole. Not nice. Also note that the diskette is held in whatever angular position it happened to land. Any slight eccentricity in the mechanical construction will be doubled if the diskette happens next to land 180 degrees round from its previous position. The 3.5" design suffers none of these disadvantages. For a start the hub is made of metal which is virtually immune from wear and tear (especially as the smaller area of the 3.5" diskettes require much smaller rotational forces anyway) and it is located by a positive clutch rather than mere friction so that it always lands in the same position.

### Sticky

If a recording is made slightly eccentric the error will not be doubled on playback because the diskette will always locate in the same way. The old 5.25" and 8" diskettes both provided for write protection. This was done by means of sticky labels which had to be stuck

on over a "write protect/write enable notch" and removed to change the status of the diskette. The modern way, built into the 3.5" diskette design, is a small plastic slider which can never be lost or come unstuck. A small point, but an example of the thought which has gone into the design.

Computers are often used by children and other unskilled operators; the 3.5" diskette is vastly superior to the normal floppies in its ability to come through such an ordeal unscathed. We ourselves can be very naughty sometimes, being too lazy to return an 8" diskette to its protective envelope and storage box after use; with a 3.5" diskette there is no need to do this because it is inherently so well protected against mishandling.

After some initial mistrust (Luddites at heart) we now are able to recommend 3.5" drives with complete confidence, and have adopted the 1 Megabyte size (about 750K after formatting) as the Interak standard for the supply and transmission of software for the system. (Of course we will not disown you if you use 5.25" or 8" but now we have decided on 3.5" as "our" standard it is inevitable that the larger sizes will fall out of favour for our users.)

In general there is a pretty fair chance that there will be good compatibility between computers using 3.5" drives they are largely standard already, 8" compatibility standards are well established but there are so many different types of 5.25" drives and disk formats there is no hope of any standard (even IBM uses several different capacities and formats for its own personal computer range, when and if it adopts 3.5" IBM will probably choose a format and stick to it this time). Although 3.5" drives of less than 1 Megabyte capacity do in theory exist, in practice they are very rarely used, since they give much inferior performance at substantially the same price, therefore 1 Megabyte is fast becoming the standard. No doubt some bright spark will cram 2 or 4 Megabytes on a 3.5" disk one day, but for the time being 1 Megabyte is the maximum.

### 3 Watts

Yet another benefit of the 3.5" drives is their very small power consumption. The distances and speeds of the mechanism are obviously less and so less powerful motors are required for the same performance. The typical power consumption is around only 3 Watts (compared to about 12 Watts for 5.25" and 50 Watts for the original mains powered 8") - cool running without need for ventilation or noisy fans. This low power means that several drives can be powered from the standard multirail Interak Power Supply (aren't you glad we advised you to buy a good power supply now!)

The drives are virtually silent in operation (in comparison with 5.25" which can be described as quiet, and 8" which can be described as noisy). The Motor control allows reduced power consumption and wear when not in active use. The mechanical performance of the drive is of the best. The track to track seek time 3 milliseconds, which is as fast as any floppy disk drive we know, and because motor control is used to prevent diskette wear, the head can remain permanently loaded, so that there is no head load time to be considered, also the unnecessary wear and tear (on the user's nerves as well as the mechanism) of earlier systems, as the heads were "pecked" up and down, is eliminated.

The size of the drives is approximately 4" x 1.3" x 6"; they are light weight, and therefore easy to install. A fixing kit is to be made available and each drive will occupy 2" of space in the rack so that a pair of drives will fit into the ordinary 3U Interak rack and still leave room for a dozen or more cards. (If you have used the space to the right of your rack for the power supply, we suggest that you move the power supply to the rear of the system to make space for a pair of drives without sacrificing any valuable card slots. Further drives can be fitted next to the first two if you can spare the space, otherwise they could be mounted externally somehow. (The maximum is 4 drives under the direct control of the FDC-1 disk interface card.)

### Greedy

The number of drives depends on your needs (and your finances!) but you can choose the number according to the following guide: 1 drive, workable, and much better than tape of course, but not as convenient as 2 drives, especially when making backups, editing and copying files. 3 drives give marginal extra convenience, merely by letting you avoid excessive disk swapping if you are working with large databases etc on multiple floppy disks. 4 drives are just plain greedy, and it is very doubtful that they would make the system any more convenient to use than having 3 drives. We recommend a minimum of 2, and if you are feeling rich a third drive will give some benefit, but we would only rarely recommend 4 drives.

The ability to read and write in double density is an integral part of the design Interak FDC-1 4-drive disk controller card, so it is pointless not to take advantage of this feature. (Beware that some very well known computer designs, for example those that use the Single Density Controller Chip type 8271, have systems that can work only in Single Density. Some suppliers, knowing that this would upset the customers if they realised what it meant, offer what they call "Double Density" by using 80 track drives in place of 40 track - true enough they store twice the amount of data but this is not because it is double density but double the number of tracks. They face a dilemma when they eventually produce a genuine double density system - what to call it? Their answer is to call it "Quad Density", so if you like you can call the Interak recommendation quad density too. We'll stick to the proper terms though.)

We are lucky enough to have chosen the 2797 disk controller chip (and to have spent a few years learning how to use it) and with its aid have managed to fit 10 sectors of 512 bytes into each track. The 2797 has a highly optimised integrated phase locked loop circuit which means the wasted space between adjacent sectors can be kept to a minimum because the 2797 needs so little time to "lock on" to the data stream. If a long time were needed for this purpose the number of sectors per track would have to be reduced to 9 or even 8, to provide a bigger safety gap between sectors.

### Swizz

Note also that the amount of storage available to the user is invariably less than the the maximum the disk will hold. This sometimes seems like a swizz to the uninitiated so deserves some explanation. You can easily see that for example a telephone directory of a given size could include lots more numbers if they didn't bother printing the subscribers names and addresses, and filled the space with more numbers. Of course it would be useless to have a telephone directory full of numbers if you couldn't find where they were, and so it is with floppy disks. There is genuinely 1 Megabyte of space on our 3.5" disk, but much has to be used in spacing the data out into individual numbered "sectors" and "tracks" which can be identified.

The precise details of how this is done make up the "format", and the format we use has 10 sectors of 512 bytes per sector on each of the 160 tracks (80 tracks per side). Further space is taken for the purposes of the disk operating system (eg CP/M or its equivalent) so not all of the formatted space is available to the user. On a 1 Megabyte disk these overheads are not a great worry, since there are still several hundreds of Kilobytes of usable space on each disk, but it can become worryingly significant on the the smaller sizes. For example if you had access to a 300 disk (standard 8") CP/M user group library, you could store this on around 100 of our 3.5" disks, but it could take around 750 disks of the smallest capacity and format to store the same data. The difference between 750 diskettes and 100 diskettes is quite substantial in cost! Even if we scale everything down by a factor of ten, you can see that 10 of our diskettes will hold as much as 75 of those in a much inferior system, which may look cheaper at first.

### Short sighted

In quite modest quantities the cost of the diskettes needed can soon equal or exceed the cost of the drive, if you are short sighted enough to purchase type of too low a capacity. (These remarks do not conflict with our earlier ones where we accused you of being a cheap skate if you would not pay extra for extra performance or benefits. Here we are talking about the sheer waste of money in buying 75 diskettes when 10 would do - if it gave you some benefit we might recommend it, but it is plain stupidity to buy one saving on a low capacity drive and effectively lose money every time you buy a diskette.)

Because 1 Megabyte is such a round number, and because everybody else seems to do it, we will often refer to our 3.5" drives as "1 Megabyte", although of course you should bear in mind our remarks on formatting above.

### Benefit

Originally the CP/M disk operating system was associated with single sided single density IBM 3740 disks exclusively, but the great benefit of CP/M is that it can be used with any size of diskette. It is easiest of all to obtain software (for purchase, and from libraries) on standard 8" disks for CP/M because it is such a universal standard, but this point should not worry the Interak user. Certainly we will be able to provide a service at nominal charge for converting IBM 3740 standard 8" diskettes to the Interak 3.5" 1 Megabyte format. It is possible that a similar service could be organised for 5.25" drive users, but we cannot be so confident about this because there are so many different types of 5.25" drives in existence. Because of the pitfalls to be faced when purchasing disk drives we can only guarantee saving you from them if we supply the drives; you can of course supply your own (this is the whole point of Interak), but to an extent you are on

your own if you get into trouble with some odd format or drive you have picked up cheaply.

You will gather that we think 3.5" diskettes are the best thing since sliced bread; in fact exhaustive tests in our own laboratories have revealed that in the 3.5" drives particularly, many brands of currently available wholemeal bread tend to break up in these drives when the head is stepped from track to track at the 3 ms rate.

### ORDERING DETAILS

Order as FDD3501, price	89.00 + VAT
Carriage on Drives (any quantity)	5.00 + VAT

Manufacturer's OEM Manual, Specifications, Installation Instructions, order as MFDD3501	5.00 nil VAT
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2" Fixing Kit (one kit needed for each drive):

For rack with screw in front plates	
DMK3501VR- price	14.75 + VAT
For rack with "Verolock" front plates	
DMK3501V price	13.75 + VAT

Diskettes, 1 Megabyte unformatted, (Sold in any quantity, but boxed in 10's)

DSDD3580, price each	2.99 + VAT
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Interface cable assembly for 2 disk drives and Interak FDC-1 card

LDFFD3P, price	10.66 + VAT
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Power supply 4-way cable assembly (one assembly required for each drive), to connect to Interak PSD-1 Card

LDFFDPS3, price	2.50 + VAT
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